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AUTHOR Borkan, Bengu; Capa, Yesim; Figueiredo, Claudia; Loadman, William E.

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ABSTRACT

School climate has been acknowledged as a construct with impact on important aspects of educational outcomes, such as student achievement, school effectiveness, and school completion. The Organizational Climate Index was an instrument developed to measure school climate (W.Hoy, 2001). This study evaluated this instrument by using Rasch measurement. The sample consisted of 110 teachers in 4 schools. Results indicate that items generally were working well, with a high reliability of 0/96. The only two items of concern referred to parent involvement in the school. This may be explained by the low community interaction in sample schools. (Contains 3 tables and 11 references.) (Author/SLD)

**USING RASCH MEASUREMENT TO EVALUATE
THE ORGANIZATIONAL CLIMATE INDEX**

Bengü BÖRKAN, Yeşim ÇAPA, Cláudia FIGUEIREDO, & William E. LOADMAN

The Ohio State University

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Abstract

School climate has been acknowledged as a construct impacting important aspects of educational outcomes, such as student achievement, school effectiveness, and school completion. The Organizational Climate Index was an instrument developed to measure school climate (Hoy, 2001). This study evaluated this instrument by using Rasch measurement. The sample consisted of 110 teachers, in four schools. Results indicated that mostly items were working well, with a high reliability of .96. The only two items of concern referred to parent involvement in the school. This may be explained by the low community interaction in sample schools.

Using Rasch Measurement to Evaluate the Organizational Climate Index

Educational literature has identified school climate as a construct impacting important aspects of educational outcomes, such as student achievement, school effectiveness (Pashiardis, 2000), and school completion (Worrel, 2000). Climate has often been referred to as the 'personality' or atmosphere of the school (Hoy, Hoffman, Sabo, and Bliss, 1996). It describes internal attributes shaped by the relationships among principal, teachers, students, and community. It also defines those relationships.

Climates can be open or closed. In open climates, the relationships among teachers and principals are open and supportive; in closed climates, they are "guarded, suspicious, controlling, restrictive, distant, and disengaged" (Hoy et al., 1996 p.42). Climate is also described as positive, when the teaching and learning are emphasized, rewarded, built upon collegiality and collaboration (Pashiardis, 2000). According to their climates, schools can also be described as caring and supportive or hostile and nonsupportive (Worrel, 2000). In a review of the climate literature, Pashiardis (2000) presents the following characteristics of effective schools: principal is an instructional leader; rules, policies, procedures are clear, well understood, and implemented by staff; school presents a common plan, shared by community and staff; teachers individualize instruction to reach all students; there is communication and collaboration; there is high expectation and enthusiasm; and an atmosphere of professionalism is present as well as press for academic achievement.

School climate has been assessed through a diversity of methods and study participants. For example, Dinham, Cairney, Craigie and Wilson (1995) used a combination of survey questionnaires, followed by in-depth case study, using interviews,

focus groups, and document analysis to assess the relationships among school climate, leadership, and decision making in three secondary schools. They gathered information from students, faculty, staff, and parents. Worrel (2000) used the Instructional Climate Inventory Form S (by Braskamp and Maehr, 1988) to measure students' perceptions of school climate. Hoy, Hoffman, Sabo, and Bliss (1996) used the Organizational Climate Descriptive Questionnaire, in both versions for elementary and secondary schools, to measure the perceptions of teachers about the climate in secondary and elementary schools. Pashiards (2000) also assessed climate at elementary and secondary schools. The author used the School Climate Questionnaire to assess teachers and principals' beliefs about climate in their schools.

Another instrument developed to measure school climate is the Organizational Climate Index (OCI), developed by Hoy (2001). It consists of four dimensions:

- a) Collegial Leadership measures whether principal "treats teachers as professional colleagues, is open, egalitarian, and friendly, but at the same time sets clear teacher expectations and standards for performance."
- b) Professional Teacher Behavior measures whether teachers show "respect for colleague competence, commitment to students, autonomous judgment, and mutual cooperation and support."
- c) Achievement Press measures whether the school 'set high but achievable academic standards and goals; students persist, strive to achieve, and are respected by each other and teachers for their academic success; parents, teachers, and the principal exert pressure for high standards and school improvement.'

d) Institutional Vulnerability measures whether the school "is susceptible to a few vocal parents and citizen groups. High vulnerability suggests that both teachers and principals are unprotected and out on the defensive."

Instruments are usually analyzed using classical test theory, in which the item statistics depend on sample characteristics. In other words, a mean score on a climate instrument reflects the perspectives of the respondents, independently from whether the items on that scale were easier or harder to be selected (endorsed). On the other hand, Rasch measurement takes into account the ability level of the respondent as well as the difficulty of the item (Wright, 1977). In other words, a logits score of teachers' perception of school climate obtained by using a Rasch procedure will reflect how strong the individual's attitudes, opinions, or perspectives are, independently from how hard or easy the items were to be endorsed.

Purpose of the study

The purpose of this study is to evaluate a modified Organizational Climate Index (OCI) using Rasch measurement.

Methods

A modified Organizational Climate Index (OCI) was used to assess the overall climate in four schools at an urban and a rural district in Ohio. Of the 30 original items (including three filler items), 22 were used in this study.

110 teachers completed a questionnaire, containing OCI, among other scales. This questionnaire was eight-pages long. It was reviewed by a panel of experts, prior to being administered. They were filled out at staff meetings, a procedure that guaranteed

response rate per school ranging from 66.7% to 87.9%. This questionnaire was part of the evaluation of an intervention program implemented at schools in academic risk.

Data were analyzed using WINSTEPS, a Rasch-model computer program (Linacre, 2000).

Results

The WINSTEPS analysis yielded the simultaneous calibration of items and persons. It also provided Separation Index, Reliability, Chi-square statistics, and Fit statistics. The person and item variable map is a good place to start with because it helps to understand if the calibration process yielded useful information.

Insert Figure 1

The range item measures was from approximately +1.4 logits to -1.4 logits, while the person measures showed a normal distribution with a wide range from +2.0 logits to -2.0 logits. The items that were difficult to endorse were "Parents exert pressure to maintain high standards" and "Parents press for school improvement." On the other hand, items such as "Teachers help and support each other," "Teachers respect the professional competence of their colleagues," and "The interactions between faculty members were cooperative" appeared to be the easiest items to endorse.

The summary of the person and item statistics also provides valuable information about the calibration of items and teachers. For items, the separation reliability was very high (.96); and for teachers, the reliability was reported as .83. Comparing the observed standard deviation of the person abilities (.73) with the adjusted standard deviation,

which represents the standard deviation of the person abilities when the measurement error is removed, indicated that most of the observed variance is in fact due to the actual differences in the teacher's perception of school climate rather than measurement error.

Insert Table 1

Fit statistics are presented by two measures for persons and items. The Outfit statistics are unweighted mean square residuals that are specifically sensitive to the outliers, whereas the Infit statistics are more sensitive to unexpected responses near the point where decisions are made (Linacre, 1994). For the purpose of this study, the upper limit of 1.8 and lower limit of 0.5 were adopted to identify the misfitting items and persons. Item fit statistics identified two noisy items out of 22 items, which were "The principal responds to pressure from parents" and "A few vocal parents can change school policy." The reason may be due to the fact that teachers do not have much experience about those incidents. When infit and outfit statistics were examined; only 7.2 percent of the persons have noisy measures.

Insert Table 2

Insert Table 3

Discussion

The analysis indicated that all items were working well, with the exception of the items "The principal responds to pressure from parents" and "A few vocal parents can change school policy." There were more variations in those items than expected. This might be due to the fact that community relations in the sample schools are not so prominent. This information was obtained from other aspects of the questionnaire as well as other components of the overall evaluation of intervention program of which the questionnaire is a part. This may also help explain why the items "Parents exert pressure to maintain high standards" and "Parents press for school improvement" were the most difficult to endorse.

Overall, according to the Rasch measurements analysis conducted in the study, the modified Organizational Climate Index is a reliable instrument to assess school climate. Noisy items could be further explored by conducting analyses at the building level as recommended by Hoy, Smith, and Sweetland (2002). In this study, the unit of analysis was teachers. Such items could also be explored by comparing schools with different levels of community relations because it appeared that the schools in this sample did not present strong community relations.

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INPUT: 110 teachers, 22 items ANALYZED: 110 teachers, 22 items, 4 CATS

	teachers -MAP- items										
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											020 040 049 096 104 108 S ap4
											044 079 086 110
											025 042 045 067 085 095 105
											043 058 060 064 068 100 M ap2 cl1 cl2 iv4
											006 024 026 027 035 046 094 101
											007 056 106 ap7 cl6
0	005	014	029	054	090	091	099	102	103	107	+M cl7
											018 028 031 037 iv2
											002 013 017 034 036 109
											053 cl3 cl5
											010 022 032 033 039 097 S
											004 030 038 093 ap1
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Figure 1
Variable Map of Teacher Measures, and Item Calibrations

Table 1
Summary Statistics

SUMMARY OF 110 MEASURED teachers								
	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	58.2	21.9	.34	.30	.99	-.3	1.00	-.3
S.D.	9.5	.7	.80	.02	.51	1.7	.53	1.7
MAX.	78.0	22.0	2.18	.37	2.81	4.4	3.01	4.6
MIN.	36.0	15.0	-1.53	.28	.24	-4.3	.26	-4.0
REAL RMSE	.32	ADJ.SD	.73	SEPARATION	2.24	teache	RELIABILITY	.83
MODEL RMSE	.30	ADJ.SD	.74	SEPARATION	2.49	teache	RELIABILITY	.86
S.E. OF teacher MEAN = .08								
SUMMARY OF 22 MEASURED items								
	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	291.2	109.5	.00	.13	.98	-.4	1.00	-.3
S.D.	43.1	1.3	.73	.00	.33	2.6	.35	2.6
MAX.	353.0	110.0	1.37	.14	1.80	5.4	1.88	5.8
MIN.	213.0	104.0	-1.04	.13	.54	-4.5	.56	-4.3
REAL RMSE	.14	ADJ.SD	.71	SEPARATION	5.10	item	RELIABILITY	.96
MODEL RMSE	.13	ADJ.SD	.72	SEPARATION	5.41	item	RELIABILITY	.97
S.E. OF item MEAN = .16								

Table 2
Summary Statistics for Items

ENTRY	RAW				INFIT	OUTFIT	SCORE			
NUMBER	SCORE	COUNT	MEASURE	ERROR	MNSQ	ZSTD	MNSQ	ZSTD	CORR.	ite
20	298	109	-.13	.13	1.80	5.4	1.88	5.8	A-.13	iv2
19	238	109	.87	.13	1.76	4.9	1.85	5.4	B .09	iv1
22	258	104	.34	.13	1.36	2.6	1.40	2.8	C .09	iv4
15	353	110	-1.04	.14	1.16	1.2	1.28	1.9	D .39	tb1
14	289	110	.06	.13	1.24	1.8	1.24	1.9	E .70	cl7
8	273	110	.32	.13	1.17	1.3	1.18	1.4	F .67	cl1
18	334	109	-.75	.13	1.15	1.2	1.17	1.3	G .46	tb4
9	268	110	.41	.13	1.04	.4	1.06	.5	H .68	cl2
16	343	109	-.91	.14	.98	-.1	1.00	.0	I .48	tb2
13	285	110	.13	.13	.97	-.3	.98	-.2	J .71	cl6
17	341	109	-.87	.14	.86	-1.2	.89	-.9	K .41	tb3
10	316	110	-.38	.13	.88	-1.0	.87	-1.1	k .74	cl3
5	347	110	-.93	.14	.82	-1.5	.83	-1.4	j .49	ap5
12	318	110	-.42	.13	.82	-1.6	.81	-1.7	i .77	cl5
11	338	110	-.76	.13	.80	-1.7	.78	-1.9	h .72	cl4
7	288	110	.08	.13	.79	-1.9	.79	-1.8	g .38	ap7
21	241	109	.82	.13	.77	-2.0	.77	-1.9	f .41	iv3
3	214	110	1.35	.14	.75	-2.1	.77	-2.0	e .60	ap3
6	213	110	1.37	.14	.65	-3.1	.69	-2.7	d .43	ap6
2	273	110	.32	.13	.62	-3.7	.63	-3.6	c .59	ap2
1	332	110	-.66	.13	.61	-3.7	.62	-3.6	b .74	ap1
4	247	110	.76	.13	.54	-4.5	.56	-4.3	a .55	ap4
MEAN	291.	109.	.00	.13	.98	-.4	1.00	-.3		
S.D.	43.	1.	.73	.00	.33	2.6	.35	2.6		

Table 3
Summary Statistics for Teacher Measures

ENTRY	RAW				INFIT	OUTFIT	SCORE	
NUMBER	SCORE	COUNT	MEASURE	ERROR	MNSQ	ZSTD	MNSQ	ZSTD
3	41	22	-1.17	.32	2.81	4.2	3.01	4.6
102	54	22	-.03	.29	2.75	4.4	2.67	4.3
15	45	22	-.79	.30	2.59	3.9	2.74	4.2
76	72	22	1.50	.32	2.24	3.3	2.71	4.0
62	40	22	-1.27	.32	2.16	3.0	2.12	2.9
28	51	21	-.09	.29	2.15	3.1	2.14	3.1
39	48	22	-.53	.29	1.94	2.6	1.90	2.6
75	68	22	1.13	.30	1.83	2.5	1.92	2.6
84	77	22	2.05	.35	1.24	.7	1.83	1.9
27	57	22	.22	.28	1.71	2.2	1.69	2.1
67	61	22	.54	.29	1.67	2.1	1.64	2.0
43	59	22	.38	.28	1.65	2.0	1.61	1.9
10	48	22	-.53	.29	1.64	1.9	1.56	1.7
64	59	22	.38	.28	1.60	1.9	1.58	1.9
33	48	22	-.53	.29	1.57	1.7	1.58	1.8
12	41	22	-1.17	.32	1.50	1.5	1.58	1.7
77	72	22	1.50	.32	1.58	1.7	1.49	1.4
32	49	22	-.44	.29	1.58	1.8	1.54	1.7
24	57	22	.22	.28	1.53	1.7	1.50	1.6
34	52	22	-.19	.29	1.45	1.5	1.42	1.4
109	52	22	-.19	.29	1.38	1.2	1.43	1.4
16	36	21	-1.53	.34	1.36	1.1	1.35	1.0
14	55	22	.05	.28	1.32	1.1	1.28	1.0
59	66	22	.95	.29	1.29	1.0	1.23	.8
44	62	22	.62	.29	1.26	.9	1.23	.8
37	53	22	-.11	.29	1.23	.8	1.21	.7
BETTER FITTING OMITTED								
5	55	22	.05	.28	.57	-1.9	.59	-1.8
40	64	22	.78	.29	.58	-1.9	.58	-1.8
79	62	22	.62	.29	.58	-1.9	.56	-2.0
19	45	22	-.79	.30	.55	-1.9	.56	-1.8
29	55	22	.05	.28	.53	-2.1	.56	-2.0
95	58	21	.50	.29	.55	-2.0	.55	-2.0
17	52	22	-.19	.29	.50	-2.3	.55	-2.0
110	62	22	.62	.29	.55	-2.1	.55	-2.0
89	67	22	1.04	.30	.52	-2.2	.55	-2.0
22	48	22	-.53	.29	.55	-2.0	.55	-2.0
107	54	22	-.03	.29	.54	-2.0	.54	-2.1
7	54	21	.16	.29	.53	-2.1	.54	-2.0
92	71	22	1.40	.31	.53	-2.0	.53	-2.0
61	65	22	.87	.29	.52	-2.2	.53	-2.1
25	60	22	.46	.28	.51	-2.3	.52	-2.2
101	57	22	.22	.28	.52	-2.2	.50	-2.3
99	55	22	.05	.28	.47	-2.5	.45	-2.6
46	58	22	.30	.28	.44	-2.7	.45	-2.6
105	61	22	.54	.29	.44	-2.7	.45	-2.7
108	64	22	.78	.29	.43	-2.8	.44	-2.7
97	48	22	-.53	.29	.42	-2.6	.43	-2.6
18	53	22	-.11	.29	.42	-2.7	.43	-2.7
21	70	22	1.31	.31	.40	-2.8	.42	-2.6
106	56	22	.13	.28	.35	-3.3	.34	-3.3
2	52	22	-.19	.29	.33	-3.4	.34	-3.3
57	65	22	.87	.29	.24	-4.3	.26	-4.0
MEAN	58.	22.	.34	.30	.99	-.3	1.00	-.3
S.D.	10.	1.	.80	.02	.51	1.7	.53	1.7

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